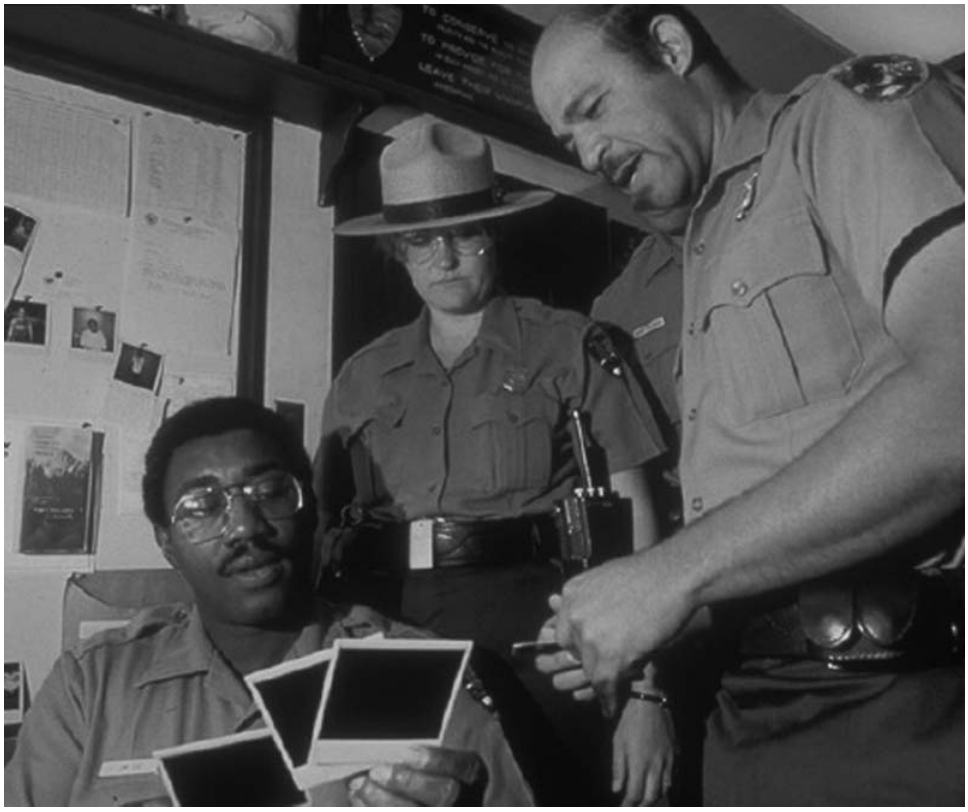
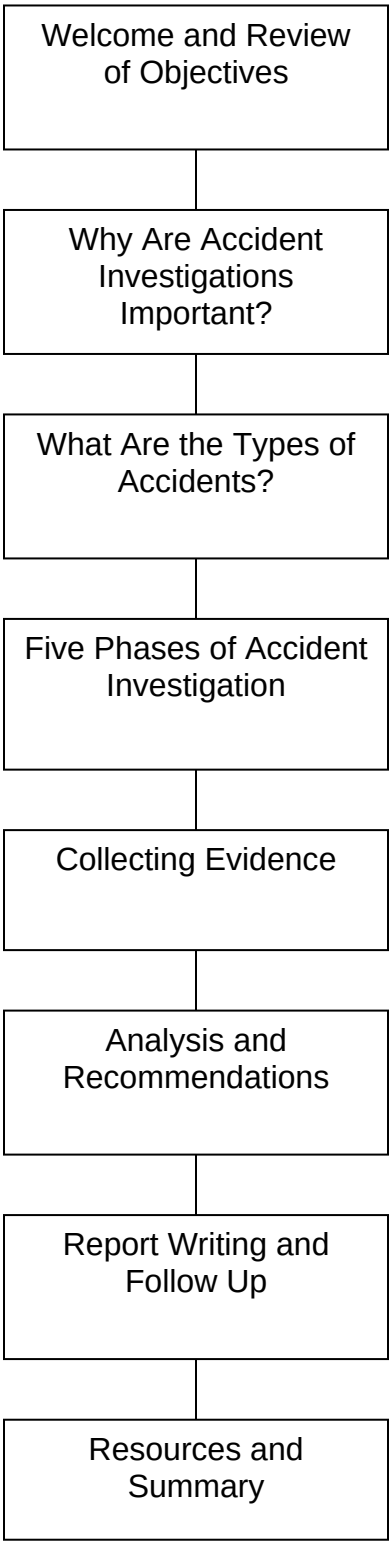
Accident Investigation: Getting to Why? To Prevent It Happened Again!



Participant Guide

Revised January 22, 2007

Accident Investigation: Getting To "Why?" To Prevent "It Happened Again!" Course Map



How to Interact with the Instructor

We encourage you to ask questions and share your comments with the instructors throughout this TELNPS course.

If you were physically in the classroom with the instructor, you would raise your hand to let him know you had a question or comment. Then you would wait for the instructor to recognize you and ask for your question. We are all familiar with that "protocol" for asking questions or making comments.

With TELNPS courses there is also a "protocol" to follow to ensure you can easily ask questions and others can participate as well. It may seem a little strange at first asking a question of a TV monitor. Remember, it is the instructor you are interacting with and not the monitor. As you ask more questions and participate in more TELNPS courses, you will soon be focusing only on the content of your question and not the equipment you are using to ask it.

As part of the TEL station equipment at your location, there are several push to talk microphones. Depending on the number of students at your location, you may have one directly in front of you or you may be sharing one with other students at your table.

When you have a question, press the push to talk button and say,
"Excuse me [instructor's first name], this is [your first name]
at [your location]. I have a question (or I have a comment)."
Then release the push to talk button. This is important.
Until you release the button, you will not be able to hear the instructor.

The instructor will acknowledge you and then ask for your question or comment. Stating your name and location not only helps the instructor, but also helps other students who are participating at different locations to get to know their classmates.

Course Objectives

Notes

At the conclusion of this course, you should be able to:

1. Describe why conducting a comprehensive accident investigation is important.
2. Define the different categories of accidents per DOI and NPS policy.
3. List the phases of accident investigation and what happens in each phase.
4. Discuss the planning process and decisions that have to be made before an investigation takes place.
5. Identify NPS documents (guidelines/policies/procedures) that apply to the accident investigation process.
6. Utilize procedures for preserving the scene and collecting causal factor evidence.
7. Demonstrate techniques for interviewing witness and getting statements.
8. Describe why analyzing an accident's cause is critical.
9. Discuss methods used to analyze data and to determine what happened in an accident.
10. Given an accident scenario, perform an analysis of possible causes (including the immediate cause(s) and the underlying causes that led to it).
11. Develop recommended corrective actions that can prevent similar accidents.
12. Prepare an accident investigation report.
13. Access resource materials and tools on the Risk Management website.

Why Conduct An Accident Investigation?

Notes

As you view this short video clip, see if there are circumstances that might also be present at your park or location.

An accident investigation answers the question:
"How can we prevent this from happening again?"
NOT "Whose fault is this?"

Accident Investigation

- Is a structured process
- Identifies correctable causes
- Focuses on preventing similar accidents from happening again
- Takes a comprehensive approach

An accident is any unplanned event that results in personal injury or in property damage.

The failure of people, equipment, supplies, or surroundings to behave or react as expected causes most accidents.

Accident investigations determine how and why these failures occur.

What Type of Incident Is This?

Review each of the accidents below. Using the table in Appendix D determine the type of incident, who should investigate it and who should review the accident investigation report.

1. An old outhouse was loaded onto the flat bed trailer for removal to the gravel pit. The load was not centered on the trailer and when tension was released, it rolled off the trailer striking a parked vehicle causing $6,000.00 damage to the parked vehicle. No injuries reported.

2. A summer volunteer graduate student was injured when a trench collapsed. The park archeologist and his team of summer volunteer graduate students were excavating a Native American village. They were digging several trenches—a 3 foot trench, a 4 foot trench, and a 6 foot trench--into sandy soil. The six foot trench was not shored. The park archeologist and a graduate student were in the bottom in the 6 foot trench when a partial collapse occurred on the north side of the trench where the student was working. A large rock with surrounding soil fell on the student, breaking his leg and burying him up to his waist. A confined space rescue team extricated the student and transferred him by MEDAVAC to the hospital. The student spent 5 days at home and 8 weeks recovering from broken leg; the student was able to resume work as the site inventory specialist on the 7th day after the accident.

3. A two wheel dolly was loaded with boxes three feet higher than the level of the rear handles on the dolly in the park warehouse. As the employee who was pushing the dolly went to negotiate a turn, the top two boxes fell off, just missing (by inches) another employee who was in the area.

4. An electrician was injured with a knife while working on a cable. The employee was stripping a 12 gauge copper wire outdoor lighting cable with a well sharpened knife. He was stripping the wire by cutting toward him. The knife slipped causing a one inch laceration to the opposite finger. The employee went to the local health clinic, received 5 stitches, and went back to work that same day.

5. Park Ranger was injured while exiting the seed storage room. She stumbled on the steps leading to the ground. She fell and hit the ground with enough force to leave her slightly disoriented. After about a minute, she was able to pick herself up. She had a slight bruise, a small raised bump below her right knee, and a couple of skinned marks on her knee. She felt that nothing was seriously wrong, and was able to continue with her duties that day after applying first aid to the bump skinned knee.

Overview of Accident Investigation Phases	
Phase	**Sample Tasks**
1. Site Protection	Cordon off the area to prevent people from moving or taking anything. Increase security personnel if needed. Identify and protect perishable or fragile items
2. Planning	Define the scope of the investigation and level of effort. Assemble the investigation team, if more than one person is required. Determine type of final report needed.
3. Fact Finding and Data Collection	Discover facts about the accident. Visit the site. Interview witnesses. Take photographs. Review documentation and other written records.
4. Analysis/Recommendations	Figure out what happened and in what sequence. Identify probably causes. Discuss and identify how similar accidents can be prevented. Analyze and recommend corrective actions.
5. Report Writing/Follow-up	Prepare and consolidate written information to explain what happened. Complete forms as required. Recommend immediate and long-term actions Implement steps to follow-up and monitor recommendations.

Site Protection Phase

Notes

Site protection

- Flag, barricade or cordon off area
- Increase security personnel if needed
- Considering covering a small area
- Determine what might be perishable (spills, footprints, etc.)

Planning Phase

Ask these five questions:

1. Who will participate?
2. What other organizations need to be involved?
3. How much time is needed?
4. What additional resources might be needed?
5. What policies, regulations, etc. apply?

Possible team members:

- Team leader
- Accident investigation advisor (unit safety officer or CDSO)
- Law enforcement personnel
- Technical specialist or subject matter expert

Policies and guidance

- DOI 485 DM7
- NPS Reference Manual 50B
- Region policies
- Park policies

Fact Finding and Data Collection Phase

Notes

Evidence is "…anything that can be used to gain knowledge or facts about the accident."

The four types of evidence we should look at during an accident investigation are:

- Parts
- Position
- Paper
- People

"Parts" refers to physical evidence—that which you can see, and that which you can test. It includes any equipment, machinery, contaminants, labels, tools, controls (electrical or power sources), debris, or protective clothing. It can even include buildings or airplanes. In arriving at the scene, the first responders must secure the site and ensure that "parts" are not repositioned, removed or altered in any way.

"Position" evidence answers the question, "Where were all of the involved items in relation to each other when the accident occurred?" The relationship of all involved items to each other is best captured through the use of photography, video cameras, maps, diagrams, sketches, or some combination.

Photographs of the accident scene can help to record information about the accident. The types of photos you may take include:

- Overviews of the scene
- Significant scene elements
- Close-ups
- A reference object (ruler, pencil, person)
- Perishable evidence (Anything that might disappear--snow, tracks, footprints, or spills)
- Witness views
- Documents
- Site inventory
- Examples of undamaged objects for comparison purposes

Fact Finding and Data Collection Phase (continued) *Notes*

"Paper" evidence includes things such as
- Procedures
- Policies
- Training records
- Performance records
- Technical manuals, SOPs, Manufacturer's manuals and instructions
- Job Hazard Analyses (JHA's)
- Equipment maintenance records
- Work related medical evaluations
- Certifications
- Job procedures
- Higher level documents (such as agency policies)

"People" that you would talk to and gather information from include:
- Supervisors
- Other members of management
- Experts
- Emergency responders

It is normal for different witnesses to provide slightly different statements about an accident due to:
- Pre-accident activity
- Witness location
- Witness profile type

Fact Finding and Data Collection Phase (continued) *Notes*

Use of Witness Statements

Investigators taking statements need to inform witnesses that their statements will be used for accident prevention purposes only by the investigation team.

However…

State that an assurance of confidentiality cannot be given.

If employees are concerned the interview may result in disciplinary action being taken against them, a request for Union representation may be made before or during the Interview (Weingarten Right) as stated in the Master Agreement

Any time a representative is requested, the interview will be discontinued until representation is obtained.

Use of Recording Devices

For complex investigation interviews, it is best to record the interview. If an interview is going to be recorded by audio or videotape, it should be with the knowledge and consent of the witness and should be transcribed and reviewed by the witness so that a complete record of the interview exists. Whenever an interview is taped, the tape becomes a part of the accident investigation record.

The investigator conducting the interview should always take notes during the interview so that there is some written documentation of the interview.

Fact Finding and Data Collection Phase (continued)

The following steps can help you when interviewing witnesses.

Select the Place. The location should be a place where the witness or other person will be comfortable. The supervisor's office is probably not a good place. The scene of the accident might work, since the items in the scene can serve to cue the witness. However, the scene may be unacceptable due to environmental factors (cold, noisy) or emotional factors if a serious injury or fatality is involved.

Open the interview by putting the person at ease. Explain why the person is being interviewed and the purpose of the investigation—fact finding, not fault-finding. It's better if you start with an open-ended question, instead of several short questions, which give the impression of an interrogation. Appendix B has a list of common questions that can get you started.

Take the initial statement. Ask the witness to tell you in his or her own words, what he or she observed. Let the witness talk without interruption. Wait out periods of silence to allow the witness to collect his or her thoughts. Make notes, and repeat important points. You may wish to track information on a form Appendix C

Expand on the interview. Based on the notes you took during the interview and your unanswered control questions, ask the witness questions to assist in his or her recollection, and attempt to fill in the gaps.

Ask about cause and prevention. It's a good idea to obtain witness's thoughts on what caused the accident and how it might have been prevented. Remember that their perspective may be limited, yet on the other hand, you might discover some causes or preventive measures that you hadn't thought of.

Obtain contact information. You may need to follow-up with another interview. Ask how to best contact the witness if additional information is needed.

Analysis and Recommendations Phase

Notes

To apply effective corrections that will prevent future accidents we have to explore what the underlying or root causes were. If we only look at the direct causes, we'll find out the hard way that the unaddressed root causes will create new accidents.

The Five Why's is a good starting point in identifying underlying causes. It consists of asking "Why" at least five times. Each why seeks to find a cause that contributed to the incident, and is a critical step in discovering underlying causes of an accident. The Five Why's method can help answer "What happened to cause this accident?"

Analysis and Recommendations Phase

Notes

Accident Cause Charting

First we start with the accident or incident. What was the event that happened? That is the first box on our chart.

Then we list the conditions or actions that were present at the time of the event.

Test what you listed to see if they are valid. We ask ourselves, "If this condition was not present, would the accident have occurred?" We are testing the conditions to see if they played a role in the accident.

Next, we take each of the conditions and ask some basic questions to see if we can discover what led to that condition occurring. Questions like, "Why?" and "How?" Hopefully, the data we have collected will provide answers to those questions.

Last we ask the question, is this correctable?

Report Writing and Follow-Up

Notes

Introduction and purpose. Where, when it occurred; who and what were involved; (operating personnel and other witnesses).

Methodology. Discuss the investigation itself, and the techniques used to determine the sequence of events, causes, and corrective actions.

Account of the accident. What happened—sequence of events, extent of damage, accident type, agency or source (of energy or hazardous materials)

Discussion. An analysis of the accident. Include the how and the why. List direct causes (energy sources; hazardous materials); indirect causes (unsafe acts and conditions); basic causes (management policies; personal or environmental factors)

Recommendations to prevent a recurrence. Include those for immediate and long-range action to remedy the basic, indirect, and direct causes. Limit your recommendations to those that affect this incident. If by chance, during your investigation, you uncovered other unsafe procedures or conditions, you should note them in a separate document and follow-up accordingly.

Appendices. These can be used as reference information. Examples of applicable appendixes are:

- Weather forecasts or conditions
- Equipment analysis, such as an expert opinion
- A list of facts collected, or photos
- Witness statements
- A list of evidence

Accident Review Committee

5.6 ACCIDENT/INCIDENT REVIEW REQUIREMENTS-

A. The Superintendent/Center Director/Operating Unit Manager will convene an Accident Review Committee (ARC), as soon as possible, to review the facts and causal factors of any accidents that have resulted in employee medical treatment beyond first-aid or, as a result of an employee action or NPS condition or activity, property damage greater than $2,500, but less than $250,000.
Other personal injuries, property damage accidents, or incidents with potential of severe outcomes are subject to examination by an Accident Review Committee, based on the potential risk and/or potential of re-occurrence. Appendix F provides additional instructions for conducting Accident Review Committee processes.

1. The purpose of the ARC is to examine and evaluate the accident investigation conducted by the supervisor, division chief and/or investigation team, to concur with or identify the root cause(s) of the accident, concur with or establish the findings of fact, and make recommendations for corrective actions. The purpose of the review is not to fix blame or find fault for disciplinary purposes, but rather to seek corrective actions to prevent further occurrences of similar incidents.

2. As a minimum, the Committee should include the Division Chief of the employee involved in the incident, one other Division Chief, a unit safety committee member or injured employee work peer, the unit Safety Officer and the Superintendent or representative from the Superintendent's office. The Superintendent may designate other members to the Committee when deemed appropriate as additional expertise is required or to replace core members in such instances where a conflict of interest is perceived. The Committee Chair should represent the Superintendent's office.

3. The Committee is responsible for completing the final findings of fact that should include the following: accident/incident summary, root cause analysis, corrective action(s), individual(s) designated to implement corrective actions, and target dates to complete actions.

4. The Superintendent reviews the Findings of Fact and makes the final approval for corrective actions and accountability of implementation.

5. Employees have the right to representation by a union representative during the proceedings of an Accident Review Committee.

Resources and References

Notes

NPS Risk Management web site

NPS Reference Manual 50B, Section 5

OSHA's online course and student handouts for "Accident Investigation" (http://www.osha.gov/SLTC/smallbusiness/sec6.html)

Accident Investigation Techniques, by Jeffrey S. Oakley

Apollo Root Cause Analysis - A New Way Of Thinking, by Dean L. Gano, Vicki E. Lee (Editor)

DOI Serious Accident Investigation Training Handbook (Video and workbook)

Appendix A – Accident Investigation Kit Contents

Basic Equipment

Barricade tape
Cones
Flashlight/spotlights (spare batteries)
Tape measure (up to 100 ft.)
Voice recorder (spare batteries and cassettes)
Camera, 35mm with date/time stamp (zoom/close-up, spare film, slide & print)
Clipboard
Notepad
Graph paper
Pencils, pens, markers
Ruler
Compass
Tweezers
Magnifying glass
Gloves (latex and work)
Personal protective equipment
Witness statement forms
Evidence log
A copy of your unit's accident investigation policy
Laptop computer/pocket computer/calculator

Optional Equipment

Binoculars
Polaroid camera with date/time stamp (close-up lens)
Video camera or camcorder
Inclinometer
Optical range finder
Handheld GPS unit
Pocket multi-tool with case
Screwdriver, flat tip
Screwdriver, Phillips
Pliers
Wrench, crescent, 8 inch
Evidence tags/bags

Appendix B – Sample Questions to Ask Accident Witnesses

General Questions. General questions are open-ended questions that can help get the witness talking. For example:

What did you see?
What can you recall?
Tell me more about that.

Directed Questions. Directed questions get the witness to focus on a specific subject, without biasing the answer. For example:

Did you notice any lights on the vehicle?

Specific Questions. Specific questions are needed for specific information (such as information about a particular light). For example:

What color was the light?

Summary Questions. Summary questions help witnesses organize their thoughts and draw attention to possible additional information. Restate what you think the witness told you in your own words and ask if that's correct. Frequently, the witness will add more information.

Avoid Leading Questions. A leading question contains or implies the desired answer. Once you ask a leading question, you have suggested what the witness is supposed to have seen. For example:

Was a red light flashing?

Techniques That Do Not Require Questions. Some interview techniques do not require questions. A nod of your head or an expectant pause may encourage the witness to talk. To keep a witness talking, say something like "uh-huh," "really," or "continue." Another technique is to mirror or echo the witness' comments. Repeat what the witness said without agreeing or disagreeing. For example:

You say you saw smoke coming from the vehicle?

Appendix B – Sample Questions to Ask Accident Witnesses (cont.)

What is your name, work address, and phone number?

What is your duty station (location) and position (job title)?

What is your technical background, skills, or knowledge?

What were you were doing before the accident happened? What did you see of the actual accident? What happened after the accident?

What is your connection with those involved in the accident?

At what time did you see the accident happen?

What attracted your attention to the accident?

What was the position of the vehicle or equipment, and individual involved in the accident, when first seen?

What was the direction of travel, fall, or final resting place of the vehicle or equipment, and individual involved in the accident? (Have the witness draw a diagram, if appropriate)

What was the weather at the time of the accident? Was it clear and sunny? Was it rainy or smoky? What were the winds conditions (velocity, gusty)?

What actions did you take at the accident site?

Were there any other witnesses around? Do the police have other witnesses' names?

Do you wear glasses or a hearing aid? What type? Did you have your glasses or hearing aid on?

What do you think was the main cause of the accident?

What do you think might help prevent this from happening again?

Is there any additional information you would like to provide? Is there anyone else that you know of that we should talk with?

Follow-up - If you think of anything else that would be helpful to the investigation please contact us.

Appendix C – Sample Interview Memorandum

MEMORANDUM OF INTERVIEW		
1. Accident Identification:		
2. Name Of Person Interviewed:		
3. Home Address (St., City, State, Zip Code):	4. Phone (H) (Area Code):	
5. Employer (Name And Address):	6. Phone (W) (Area Code):	
7. Location Of Interview:	8. Name Of Interviewer:	
9. Others Present:	10a. Started Date: Time:	10b. Ended Date: Time:
11. Remarks:		
12. Interviewer's Signature:	13. Witness' Signature:	
Page _____ of _____		

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Appendix D – Classification of Incidents

Classification	Description	Who Investigates?	What Accident Investigation Report is Required?	Who Reviews the Accident Report?
Incident with Potential	Unplanned "near-miss" event involving National Park Service property, employees, volunteers, contractors, emergency fire fighters, the public or the environment that could have resulted in an injury, illness, or property loss, but did not.	First Line Supervisor	SMIS Entry	Safety Officer Superintendent*
Minor Incident/Accident	First-aid treatment only with no lost-days from work, and/or property damage less than $2,500, no loss of consciousness.	First Line Supervisor	SMIS Entry	Safety Officer Superintendent*
Recordable Accident Level #1	Result in injuries beyond first-aid, but NOT involving loss of consciousness, lost-days away from work, or restricted work activity,	First Line Supervisor	SMIS Entry	Safety Officer Superintendent*
Recordable Accident Level #2	Result in injuries beyond first-aid, involving loss of consciousness, lost-days away from work, restricted work activity or transfer from the victim's normal job.	Team headed by Employee's Division Chief or Other Division Chief Assigned to Investigate	Separate written report in addition to SMIS Entry	ARC Superintendent*
Significant Property Damage/Operating Loss Incidents (No Injuries)	Accidents that incur property damage but do not involve employee injuries or fatalities are not reportable to OSHA. However, all accidents with property damage of more that $2,500 but less than $250,000 shall also be investigated.	Team headed by Employee's Division Chief or Other Division Chief Assigned to Investigate	Separate written report in addition to SMIS Entry	ARC Superintendent*
Serious Accidents	Involve a fatality of an employee (NPS, VIP, volunteer), hospitalization of three or more employees from a single occurrence; and/or incidental damage to NPS property of $250,000 or more.	Serious Accidents will be investigated by a Serious Accident Investigation Team (SAIT) as required by DM 485, Chapter 7, Section 5.8	Formal Report	Regional Director

* or Operating Unit Manager

Appendix E – Evidence Log (for non-photographic evidence)

Incident Identification: _____

Evidence Custodian: _____

Date Collected	Name of Individual who Collected the Evidence	Name of Person Logging the Evidence	Description of Evidence	Remarks (location found, etc.)	Evidence Identification Number	Sign In (Signature Required)	Date Signed-in

Appendix F – Explanation of Committees and Boards

Accident Review Committee	Boards of Survey	Boards of Inquiry
Will be convened for employee accidents/incidents resulting in recordable injuries or government property damage greater than $2,500 but less than $250,000. An Accident Review Committee will also be convened for a visitor injury resulting in death that was not directly related to NPS operations or facilities. Park Superintendents are encouraged to convene Accident Review Committees for other events or near-miss incidents that had the potential of severe outcomes and/or the potential for recurrence. It is the responsibility of the Accident Review Committee to examine and evaluate the accident investigation conducted by the supervisor, Division Chief and/or Investigation Team with the purpose of validating/determining the root cause(s) of the accident/incident, establishing findings of fact, and making recommendations for a corrective action plan. The findings of the Accident Review Committee are submitted to the Operating Unit Manager for review and final approval. The purpose of the evaluation is not to fix blame or find fault, but rather to seek corrective actions to prevent further occurrences.	Investigate circumstances surrounding lost, stolen, damaged, or destroyed and unserviceable property. It establishes requirements for investigation, reporting findings, and making determinations for the relief of accountability. It also prescribes personal financial liability for lost, stolen, damaged, or destroyed Government property, and review of survey actions.	To review incidents concerning: (1) The discharge of a firearm by a law enforcement officer at another individual, (2) The use of force by a law enforcement officer that results in the death or serious injury of another individual, (3) Any incident that results in the death or serious injury of a law enforcement officer, or (4) Any incident deemed appropriate for review by the Law Enforcement Administrator. Each bureau/office shall ensure that the Board of Inquiry is authorized as the proper authority to complete the board's mission. The Board of Inquiry shall analyze all factors relating to the incident and shall prepare a report of its review and findings that will provide an analysis of the incident, any conclusions derived from the facts presented, suggest corrective actions, or make recommendations in an attempt to prevent the recurrence of a similar incident or improve the handling of future incidents.

Note: You may hear the term Board of Review. This is an external review process that validates serious accident investigations.

Appendix G – NPS Occupational Safety and Health Personnel

Revised: December 30, 2006

NPS Risk Management Division (WASO) Richard Powell Chief, Risk Management Division Richard_Powell@nps.gov 202 513 7218 Louis Rowe, CSP Deputy Program Manager Louis_Rowe@nps.gov 202 513 7222	 Ed Perez Occupational Health Manager Edward_Perez@nps.gov 202 513 7214 Glenn Dean Safety Training Officer Glenn_Dean@nps.gov 202 536 5596
Regional Risk Managers Northeast Region Jill Hawk Jill_Hawk@nps.gov 215 597 5386 National Capital Region Rose Capers-Webb Rose_Capers-Webb@nps.gov 202 619 7266 Southeast Region Linda Giles Linda_Giles@nps.gov 404 562 3108 ext 650 Midwest Region Dickie Brown Dickie_Brown@nps.gov 402 221 3419	 Intermountain Region Jennifer Sahmel Jennifer_Sahmel@nps.gov 303 969 2702 Pacific West Region Larry Nolen Larry_Nolen@nps.gov 206 220 4246 Alaska Region Jay Cable Jay_Cable@nps.gov 907 969 2702
Regional Industrial Hygienists Intermountain Region Jennifer Sahmel Jennifer_Sahmel@nps.gov 303 969 2702	